

A REVISION OF *ZACREMNOPS* SHARKEY AND WHARTON
(HYMENOPTERA: BRACONIDAE: AGATHIDINAE)

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Abstract.—The genus *Zacremnops* Sharkey and Wharton (Hymenoptera: Braconidae: Agathidinae) is revised. Four species are recognized of which two, *Z. ekchuah* and *Z. coatlicue* are new to science. The nominal species *Z. oranensis* de Fernández and *Z. petiolatus* (Szépligeti) are synonymized with *Z. chiriquensis* (Cameron). A diagnostic key to species is presented and phylogenetic relationships among the species are discussed.

Key Words: Hymenoptera, *Zacremnops*, revision

INTRODUCTION AND HISTORICAL REVIEW

The genus *Zacremnops* was proposed by Sharkey and Wharton (1985) to include two species, *Z. petiolatus* (Szépligeti) and *Z. albitarsus* (Cresson), previously placed in *Megagathis* Kriechbaumer. De Fernández (1987) revised the species of Argentina and Bolivia and described a new species *Z. oranensis*. Studies of additional material since the publication of these works has indicated two new synonyms, two new species and apparently two morphotypes in one previously described species. These findings are presented in this paper.

PHYLOGENY

The relationships of *Zacremnops* within the Agathidinae were discussed by Sharkey and Wharton (1985) and nothing will be added to the argumentation presented there. The phylogenetic relationships among the species of *Zacremnops* are problematical. The species vary in only a few characters and all of these occur in both states in the outgroups, *Cremnops* and *Labagathis*. The sister group of *Zacremnops*, *Labagathis*, has a color pattern similar to that of *Z. chiriquensis*

and *Z. coatlicue*. Indeed, this color pattern is widespread throughout the secondary outgroup, *Cremnops*, and therefore appears to be the plesiomorphic condition within *Zacremnops*. The predominately black coloration, which is very rare in *Zacremnops* and absent in the monotypic sister group, is hypothesized to be a synapomorphy diagnosing *Z. cressoni* and *Z. ekchuah*. Thus the preferred, though weakly supported, hypothesis can be summarized as follows: ((*Z. chiriquensis*) (*Z. coatlicue*) (*Z. cressoni* + *Z. ekchuah*)) or *Z. cressoni* and *Z. ekchuah* are sister species but the phylogenetic placement of the two other species remains uncertain.

TEXT CONVENTIONS

Abbreviations of depositories follow the conventions of Arnett and Samuelson (1986).

- AEIC: American Entomological Institute, Gainesville, Florida, U.S.A.
AMNH: American Museum of Natural History, New York, New York, U.S.A.

- ANSP: Academy of Natural Sciences, Philadelphia, Pennsylvania.
- BMNH: British Museum of Natural History, London, England.
- CNCI: Canadian National Collection of Insects, Ottawa, Ontario, Canada.
- FSCA: Florida State Collection of Arthropods, Gainesville, Florida, U.S.A.
- HNHM: Hungarian Natural History Museum, Budapest, Hungary.
- IMLA: Fundación e Instituto Miguel Lillo, Tucuman, Argentina.
- MCZC: Museum of Comparative Zoology, Cambridge, Massachusetts.
- MNHN: Muséum National d'Histoire Naturelle, Paris, France.
- TAMU: Department of Entomology Insect Collection, Texas A&M University, College Station, Texas.
- UGCA: Department of Entomology Collection, University of Georgia, Athens, Georgia.
- USNM: United States National Museum of Natural History, Washington, D.C., U.S.A.
- ZMHB: Bereich Zoologisches Museum, Berlin, German Democratic Republic.

TAXONOMIC TREATMENT

Zacremnops Sharkey and Wharton, 1985.

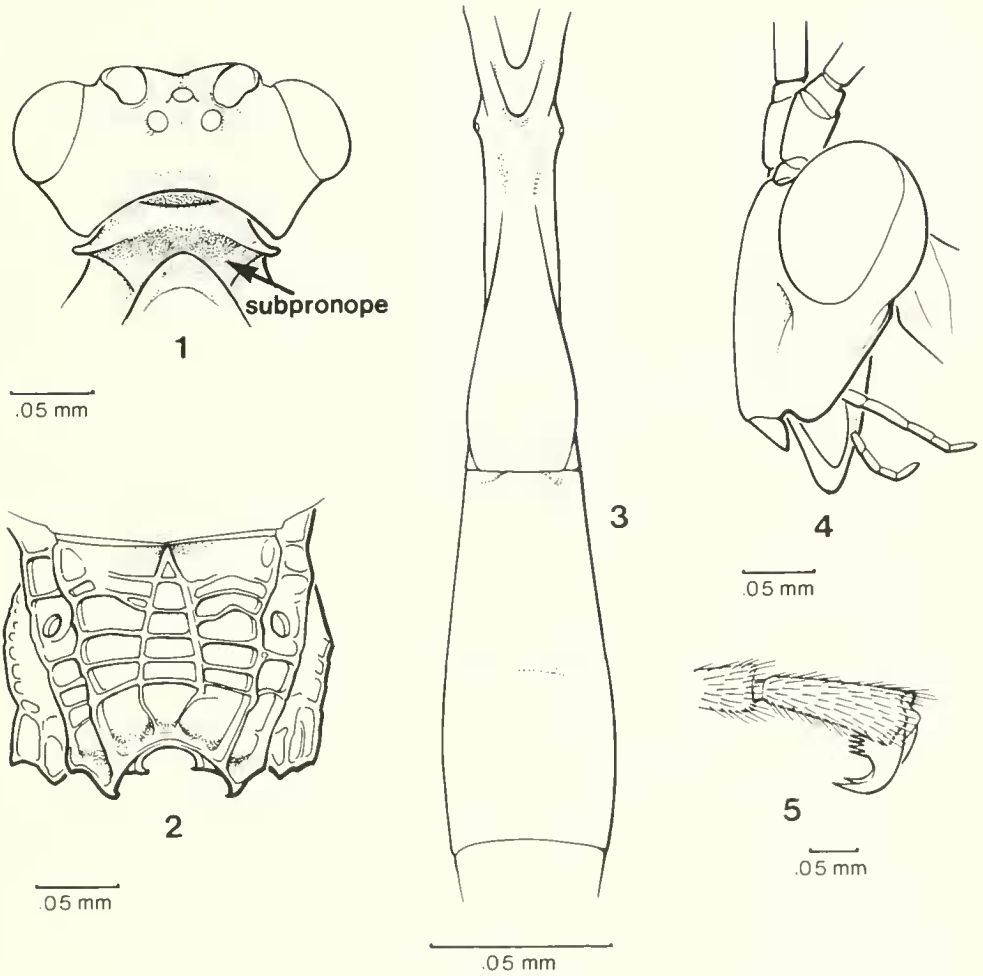
Type-species.—*Agathis albitarsis* Cresson (= *A. cressoni* Cameron, new name for *albitarsis* Cresson). 1865, p. 63, male, ANSP, type no. 1729.1. Type designation by Sharkey and Wharton (1985).

Description.—Males and females. (From Sharkey and Wharton, 1985). Head (Figs. 1, 4). Distance between median ocellus and lateral ocellus much greater than distance between lateral ocelli; median ocellus situated much lower on face than lateral ocelli; frons, between median ocellus and antennal sockets, smooth and shining, carinae lacking; occiput slightly excavated for reception

of pronotum (Fig. 1); malar space long, 0.7–0.8 × eye height; longitudinal carina between antennae weak or absent; anterior tentorial pit about 2 × closer to eye than to mandibular condyle; maxillary palpus 5-segmented, second and last segments sometimes longest, often all segments subequal (Fig. 4); labial palpus 4-segmented, basal 3 segments subequal, apical segment may be slightly longer (Fig. 4); clypeus almost as high as wide, height : width ratio about 0.8.

Mesosoma (Figs. 1, 2, 5–7).—Anterior and posterior portions of pronotum, medially, separated by deep transverse groove (i.e. subpronopes confluent) (Fig. 1); propleuron without protuberances; sternaulus well developed, usually complete to epicnemial carina (Fig. 7); epicnemial carina approaching pronotum near mid-height of posterior margin of pronotum; at least ventral half of metapleuron arcolate-rugose; notauli deeply impressed, smooth; scutellum with posterior transverse ridge weak or absent; propodeum areolate (Fig. 2); propodeal spiracles oval; hind coxal cavities closed; fore tibia lacking spines apically; mid tibia with apical spines but lacking spines admedially; all tarsal claws bifid with pectination basally (Fig. 5); hind trochanterellus lacking longitudinal carina; hind coxa large, about 2 × longer than mid coxa; 1RS cell of fore wing quadrate (Fig. 6); 2RS2 vein (really a spurious vein) absent or present as a stub (Fig. 6); cells 1M and 1R1 of fore wing confluent (Fig. 6); last abscissa of Cu vein of hind wing present and well sclerotized basally; last abscissa of Cu vein of hind wing positioned closer to vein A than to vein M+Cu (Fig. 6); 2r-m crossvein (really a spurious vein) of hind wing weakly indicated or completely absent.

Metasoma (Fig. 3).—First tergum long and narrow, 2.6–4.2 × longer than apical width; apex of first tergum more than 2 × wider than base; all terga mostly smooth; ovipositor longer than metasoma but shorter than body length when fully exposed.



Figs. 1-5. *Zacremnops cressoni* female: 1, dorsal aspect of head and pronotum; 2, propodeum; 3, dorsal aspect three basal metasomal segments; 4, lateral aspect of head; 5, tarsal claw.

Color.—Wings infuscated, with several small hyaline patches (Fig. 6), lacking yellow bands or spots; body mostly to entirely black and usually with some yellow, red or yellowish red color on legs, head, mesosoma or metasoma anteriorly.

Body length.—Most specimens are large, from 9 to 13 mm; some specimens of *Z. chiriquirensis* may be as small as 6.5 mm.

KEY TO ADULTS OF SPECIES OF ZACREMNOPS

- 1. Hind tarsus yellow *Z. cressoni*
- 1'. Hind tarsus black 2

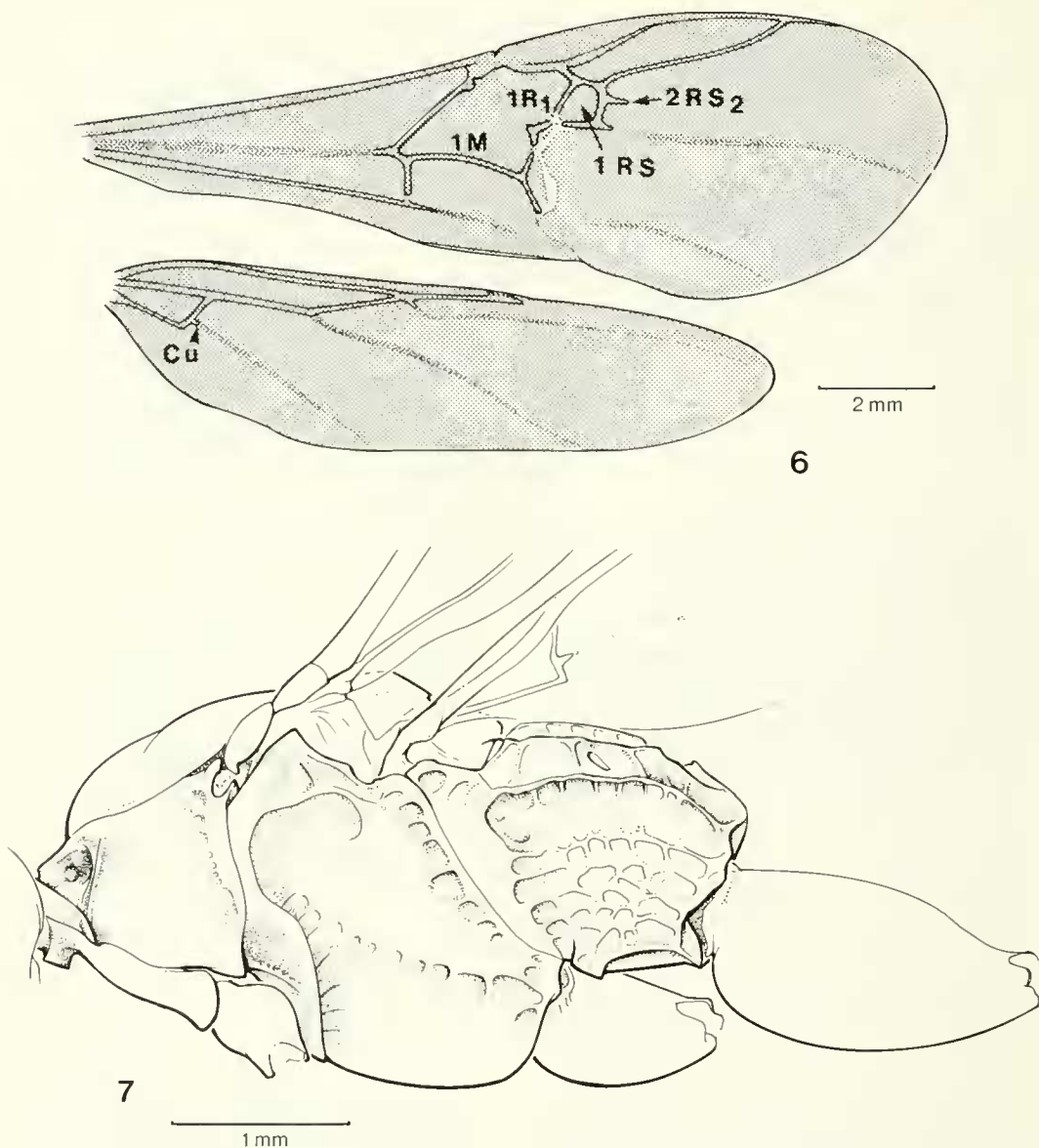
- 2(1'). Body entirely melanic *Z. ekchuah*
- 2'. Body partly reddish orange or yellow 3
- 3(2'). Mesopleuron black *Z. coathicue*
- Mesopleuron reddish orange *Z. chiriquirensis*

***Zacremnops chiriquirensis* (Cameron),
NEW COMBINATION**

Agathis chiriquirensis Cameron, 1887, p. 399.
Cremnops petiolatus Szépligeti, 1902, p. 65.
SYN. N.

Megagathis? petiolata (Szépligeti), 1904, p. 122.

Megagathis petiolata: Enderlein, 1920 (1918), p. 167.



Figs. 6-7. *Zacremnops cressoni* female: 6, fore and hind wing; 7, lateral aspect of mesosoma.

Zacremnops petiolatus: Sharkey and Wharton, 1985, p. 603.

Zacremnops oranensis de Fernández, 1987, p. 90. **NEW SYNONYMY**

Diagnosis.—Males and females. Color mostly black, metapleuron and propodeum reddish orange.

Description.—Antenna with 39-46 flagellomeres; metapleuron rugose reticulate in ventral $\frac{2}{3}$, smooth to partly rugose in dorsal $\frac{1}{3}$; hind femur from weakly rugose punctate to smooth with scattered punctures; body length 6.5 to 12.5 mm; body color mostly black; mesopleuron, metapleuron and propodeum reddish orange,

some or all of following parts sometimes reddish orange: mouthparts, fore tarsus, base of hind coxa, scutellum, metanotum and basal half of first metasomal segment; rarely mouthparts yellow or reddish orange.

Distribution.—Map 1. Restricted to South America with one record from Panama. Probably widespread north of the 30th parallel except in excessively dry or high areas.

Type material.—*Agathis chiriquensis* (Cameron), Holotype female, PANAMA, David, (BMNH, 3.c.933) (examined). *Zacremnops oranensis* de Fernández, Holotype female, ARGENTINA, Salta, Rio Pescado, Oran, 30.IV.1968, (Porter, IMLA) (examined). *Cremnops petiolatus* Szepligeti, Lectotype female, BRAZIL, Amazonas, Tonantins, (HNHM) (examined).

Depositories.—The more than 400 specimens that I have identified are in the following collections: AEIC, AMNH, BMNH, CNCI, FSCA, HNHM, IMLA, MCZC, USNM, ZMHB.

Remarks.—This species is widespread and rather variable morphologically. De Fernández (1987) based the recognition of a new species, *Z. oranensis*, which I consider to be a junior synonym of *Z. chiriquensis*, on the presence or absence of two longitudinal carinae on the first metasomal tergum. After examining over 400 specimens of this species I have come to the conclusion that the character is variable intraspecifically. The carinae grade from quite strong to completely absent with no correlation with other characters or with geographic distribution. De Fernández (1987) based her conclusions on ten specimens and therefore did not have the advantage of observing the variation of this character. She also used a character to separate *Z. cressoni* from (what I consider to be) *Z. chiriquensis* that does not prove to be valid when many specimens are examined. This is the presence or absence of a complete median longitudinal carina separating the subpronopes.

Z. coatlicue is very close to *Z. chiriquensis* and the two may prove to be conspecific.

Though, at present I am persuaded that they are separate species because of three characters: the difference in coloration, with *Z. chiriquensis* having more reddish-orange coloration; the difference in size, *Z. coatlicue* generally being composed of larger specimens; and *Z. coatlicue* having a relatively more robust and wider metapleuron with the dorsal smooth area being substantially larger and mostly lying on a horizontal rather than vertical plane. All of these characters are somewhat variable, but taken together they indicate distinct species.

Zacremnops coatlicue, NEW SPECIES

Etymology.—Named after Coatlicue, a hideous Mixica chthonic goddess, with a thirst for blood.

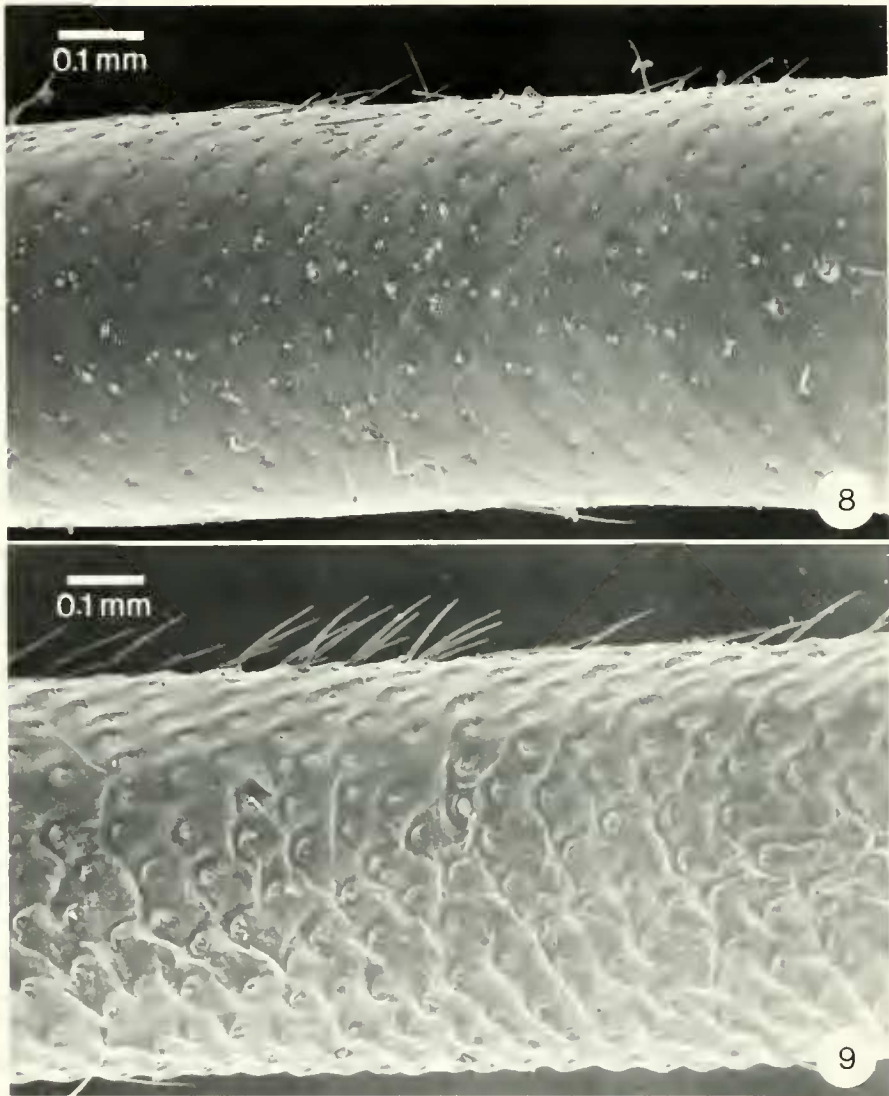
Diagnosis.—Males and females. Color black except metapleuron and propodeum reddish orange.

Description.—Males and females. Antenna with 44–46 flagellomeres; metapleuron rugose reticulate in ventral $\frac{3}{5}$, smooth in dorsal $\frac{2}{5}$; hind femur from weakly rugose punctate to smooth with scattered punctures ventrally; body length 11.3 to 15.0 mm.; body color entirely black except metapleuron and propodeum reddish orange, rarely (two specimens) the mesopleuron is reddish-black posteriorly.

Distribution.—Map 2. Restricted to Mexican and Central American lowlands. Near the Pacific specimens are found in deciduous forest as far south as Guanacaste Province in Costa Rica and as far North as Sinaloa State in Mexico. Specimens collected near the Caribbean coast are from habitats that once were tropical rainforest, perhaps indicating that the species has a wide range of moisture tolerance.

Type material.—Holotype female, COSTA RICA, Guanacaste, Santa Rosa Park, 22.V.1978 (Janzen, AEIC).

Paratypes.—Allotype, male, same data as holotype except date 8.V.1977. COSTA RICA: Guanacaste: 3 females, same data as holotype except dates 20.V.1978, 21.V.1978



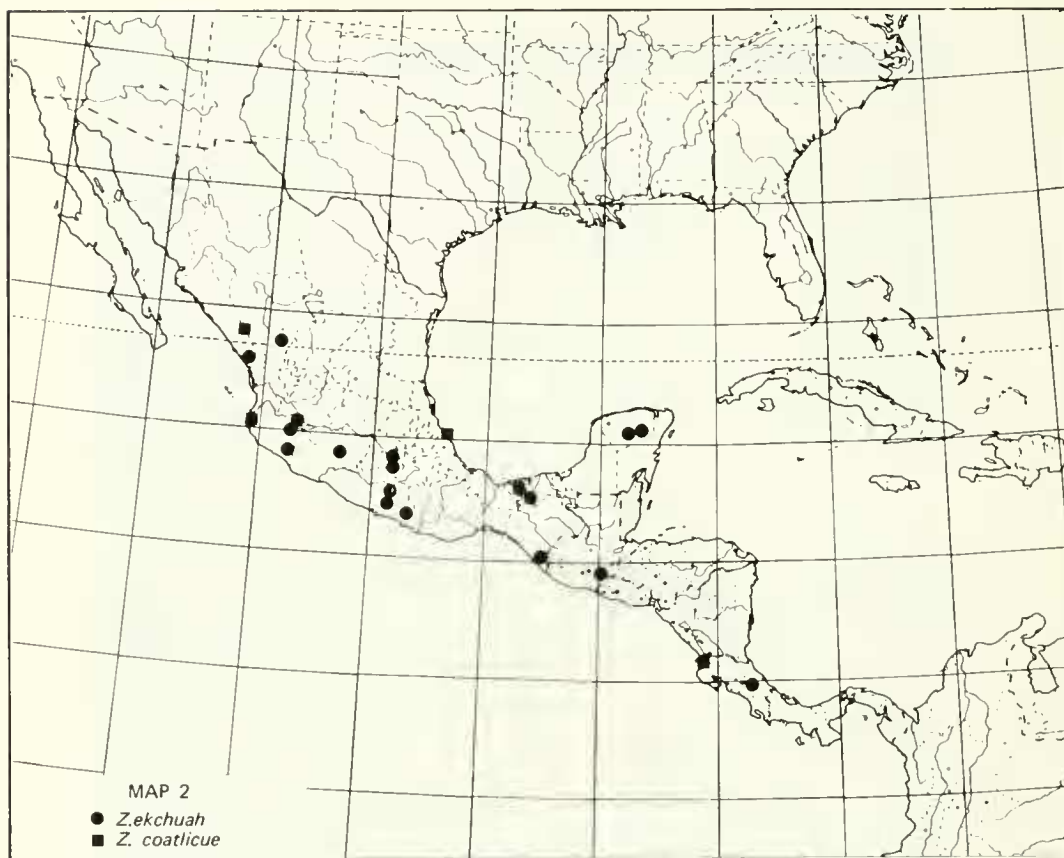
Figs. 8-9. *Zacremnops cressoni* female; 8, ventral aspect of punctate hind femur; 9, ventral aspect of rugose hind femur.

and 18.VI.1978. MEXICO: Jalisco: 1 female, Puerto Vallarta, 18-23.VII.1961 (Grant, CNCI). Sinaloa: 1 female, 8 mi. (13 km) S. Elota, 2.VII.1963, (Parker and Stange, USNM). 1 male, Venodio, (Rosche, USNM). Veracruz: 1 female, Tecolutla, 19.VI.1951 (Evans, AEIC).

Zacremnops cressoni (Cameron)
(Figs. 1-9)

Agathis albitarsus Cresson, 1865, 4: 63.
(preoccupied by *A. albitarsus* Spinola, 1840).

Cremnops albitarsis: Schulz, 1906, p. 137.



Map 2. Distribution of *Z. ekchuah* ● and *Z. coatlicue* ■.

Megagathis albitarsis: Enderlein, 1920 (1918), p. 167.

Agathis cressoni Cameron, 1887 (new name for *A. albitarsis*), p. 398.

Cremnops cressoni: Ashmead, 1895 (1894), p. 123.

Zacremnops cressoni: Sharkey and Wharton, 1985, p. 599.

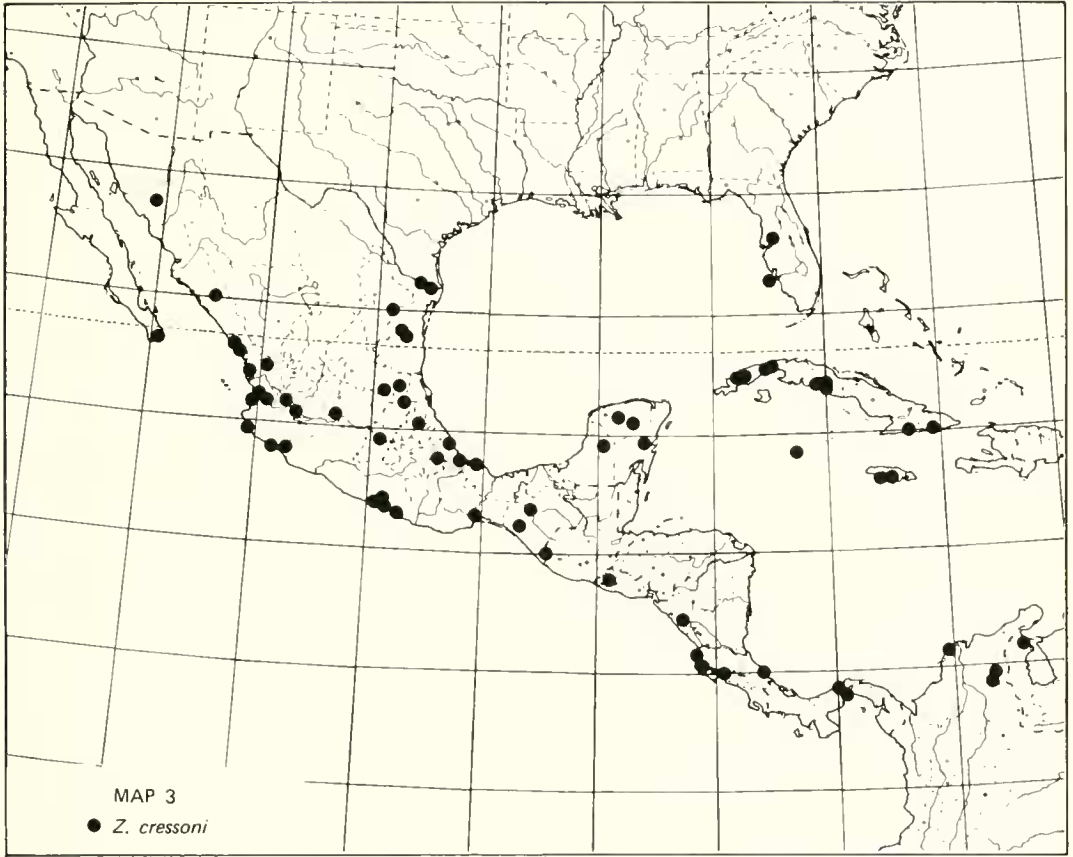
Diagnosis.—Males and females. Hind tarsus yellow, remainder of body usually black, often with yellow markings, never with reddish orange markings.

Description.—Males and females. Antenna with 42–49 flagellomeres; metapleuron rugose reticulate in ventral $\frac{2}{3}$, smooth to partly rugose in dorsal $\frac{1}{3}$; hind femur from rugose to smooth with scattered punctures;

body length 9.2 to 13.0 mm; usually body color entirely black except yellow hind tarsus, rarely some or all of following parts also yellow: gena, face, mouthparts, propleuron, mesopleuron, pronotum, mesonotum, fore leg, middle leg, trochanter, trochanterellus, femur and tibia of hind leg, basal $\frac{1}{3}$ of metasoma.

Distribution.—Map 3. This is the only species of *Zacremnops* in the U.S.A., occurring in Florida and southern Texas. It is widespread throughout Mexico except in the north-central region, widespread throughout the Greater Antilles, and Central America south to northern Colombia and Venezuela.

Type material.—Holotype male, CUBA, (ANSP) (examined).



Map 3. Distribution of *Z. cressoni*. Specimens with ventral surface of hind femur smooth with punctures ●. Specimens with ventral surface of hind femur rugose to rugose punctate ■.

Depositories.—The 440 specimens that I have identified are in the following collections: AEIC, AMNH, BMNH, CNCI, FSCA, MCZC, MNHN, TAMU, UGCA, USNM.

Remarks.—There appear to be two distinct morphotypes of *Z. cressoni*. Specimens from the Greater Antilles, Florida and the Yucatán peninsula differ from the remainder of the specimens in that the ventral surface of the hind femur is smooth with scattered punctures (Fig. 8) as opposed to rugose (Fig. 9). Members of this population (Greater Antilles etc.) are generally smaller, darker and have fewer flagellar segments. On the basis of these character states, it seems possible that the two populations constitute separate species. Since the known

distributions of the two groups are allopatric, I take a conservative approach and treat them as one species.

Zacremnops ekchuah, NEW SPECIES

Etymology.—Named after Ekchuah, Maya god of merchants, who is said to cover himself in black paint.

Diagnosis.—Males and females. Body entirely black.

Description.—Males and females. Antenna with 45–47 flagellomeres; metapleuron rugose reticulate in ventral $\frac{2}{3}$, smooth to completely rugose in dorsal $\frac{1}{3}$; hind femur from weakly rugose punctate to smooth with scattered punctures ventrally; body length 10.6 to 15.0 mm; body color entirely black.

Distribution.—Map 2. Found in semi-tropical and tropical areas from Mexico south to Costa Rica.

Type material.—Holotype, female, MEXICO, Colima, 9 mi. (14.4 km) n.e. Comala, 17–18.VII.1983, (Kovarik, Harrison, Schaffer, CNCI type #20268).

Paratypes.—Allotype, male, same data as holotype. COSTA RICA: 2 males, Turrialba, VIII.1963, (Porter, MCZC). 1 male, Turrialba, 24.V.1944, (Schrader, USNM). GUATEMALA: 1 female, Yepocapa, VIII.1949, (Dalmat, USNM). MEXICO: Chiapas: 20–25 mi. (32–40 km) N. Huixtla, 3000' (1000 m), 2.VI. and 4.VI.1969, (Teskey and Peterson, CNCI). Durango: 2 males, Nombre de Dios, VIII.1951, (Evans, AEIC). Guerrero: 1 male, 2.1 mi. (3.4 km) N. Cahuamilpa, 19.VII.1984, (Carroll, Schaffner, Friedlander, TAMU). 4 males, Omiltemi, 8000' (2700 m), VIII.1904, (Smith, BMNH). 11 females, 4 males, Xucumanatlan, VII.1904, (Smith, BMNH). Jalisco: 1 female, 1 male, Aijijic, 16–18.VII.1966, (Flint and Ortiz, USNM). 1 female, Guadalupe, 26.VII.1951, (Hurd, USNM). 1 male, Puente Grande, 5000' (1700 m), 20.VIII.1954, (Chillcott, CNCI). Michoacán: 1 male, 18 mi. (29 km) N.W. Quiroga, 6400' (2100 m), 22.VIII.1962, (Painter and Painter, AEIC), Morelos: 5 females, Cuernavaca, VII–VIII.1944 and 1965, (Krauss, USNM). 1 female, Cuernavaca, IX.1923, (Smyth, USNM). 1 male, 5 mi. (8 km) E. Cuernavaca, 16.VII.1963, (Parker and Stange, USNM). 2 females, Tepoztlán, 20.VIII.1956, (Dreisbach, USNM), 1 fe-

male, 3 mi. (4.8 km) S. Tepoztlán, 16.VIII.1962, (Painter and Painter, AEIC). Sinaloa: 2 females, 3 males, Santa Lucia, 4000' (1300 m), 25.VII–4.VIII.1964, (Mason and McAlpine, CNCI). Tabasco: 1 female, 1 male, Teapa, II–III.1904, (Smith, BMNH). Yucatán: 1 male, Pisté, V.1957, (Townes, AEIC).

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REFERENCES

- Arnett, R. H. and G. A. Samuelson. 1986. The Insect and Spider Collections of the World. E. J. Brill/Flora & Fauna Publications, Gainesville. 220 pp.
- Cameron, P. 1887. Insecta. Hymenoptera, 1. Biol. cent-am. 1: 1–487.
- Cresson, E. T. 1865. On the Hymenoptera of Cuba. Proc. Entomol. Soc. Phil. 4: 1–200.
- De Fernández, C. D. B. 1987. El genero *Zacremnops* Sharkey y Wharton (Hymenoptera, Braconidae, Agathidinae) en Argentina y Bolivia. Acta Zool. Lilloana 39(1): 89–93.
- Enderlein, G. 1920 (1918). Zur Kenntnis aussereuropäischer Braconiden, Agathidinae. Arch. Naturgeschichte 84(A)11: 162–213.
- Sharkey, M. J. and R. A. Wharton. 1985. Redefinition of *Megagathis*, and reassignment of New World species to *Zacremnops* new genus (Hymenoptera: Braconidae: Agathidinae). Can. Entomol. 117: 599–603.
- Szépligeti, G. V. 1902. Tropische Cenocoelioniden und Braconiden aus der Sammlung des Ungarischen National-Museums. Termész. Füzetek 25: 39–84.
- . 1904. Hymenoptera Fam. Braconidae. Genera Insectorum 4(22): 253 pp.